

Pharmacology

Drugs that Affect the
Endocrine System

Topics

- Pituitary Drugs
- Parathyroid/Thyroid Drugs
- Adrenal Drugs
- Pancreatic Drugs
- Reproductive Drugs
- Sexual Behavior Drugs

Functions

- Regulation
- Control

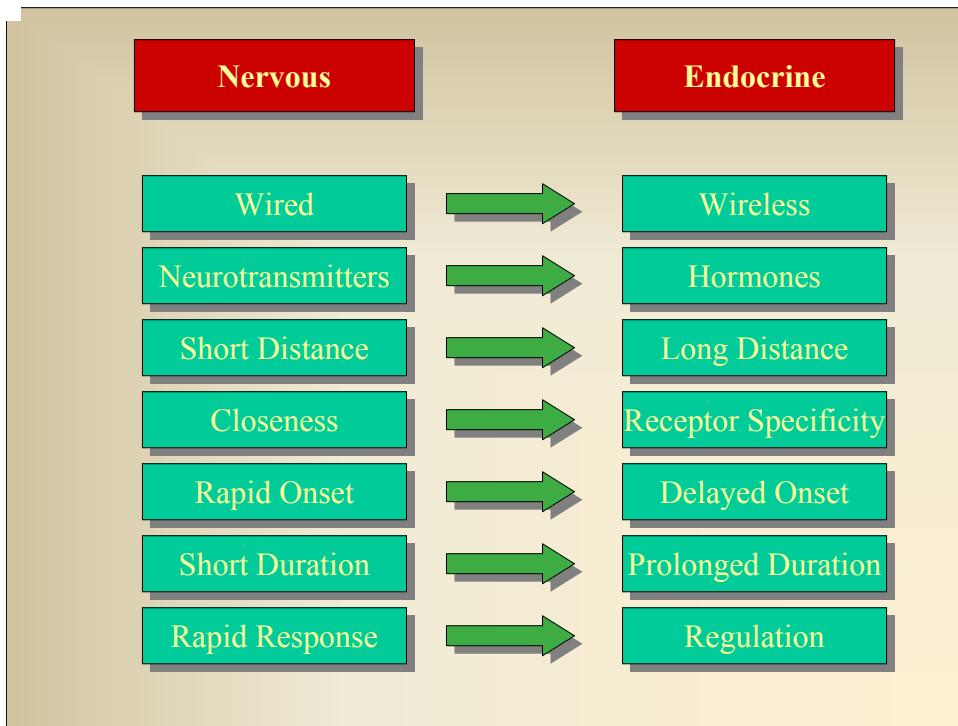
Glands

Exocrine

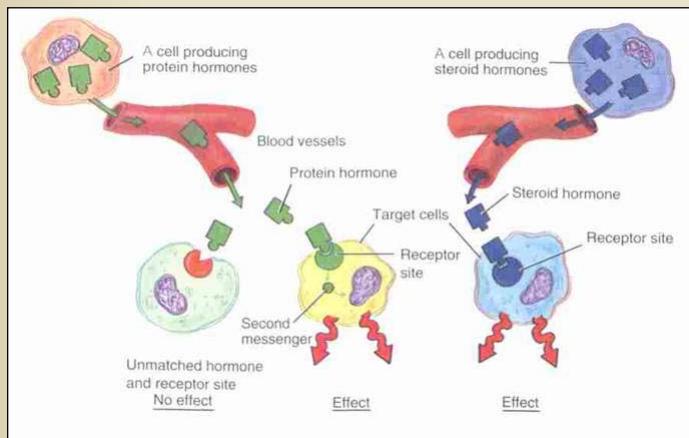
- Secrete enzymes
- Close to organs

Endocrine

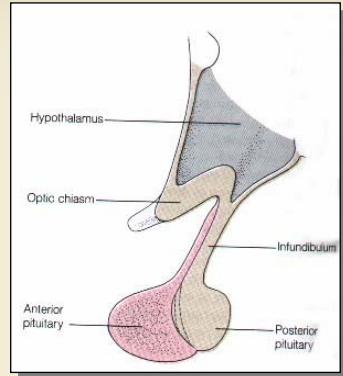
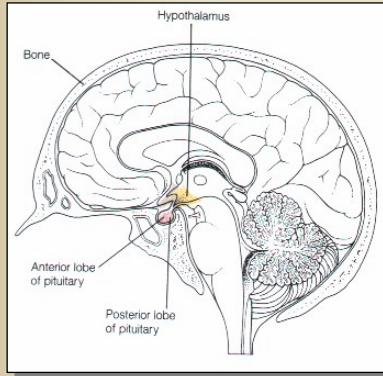
- Secrete hormones
- Transport via bloodstream
- Require receptors



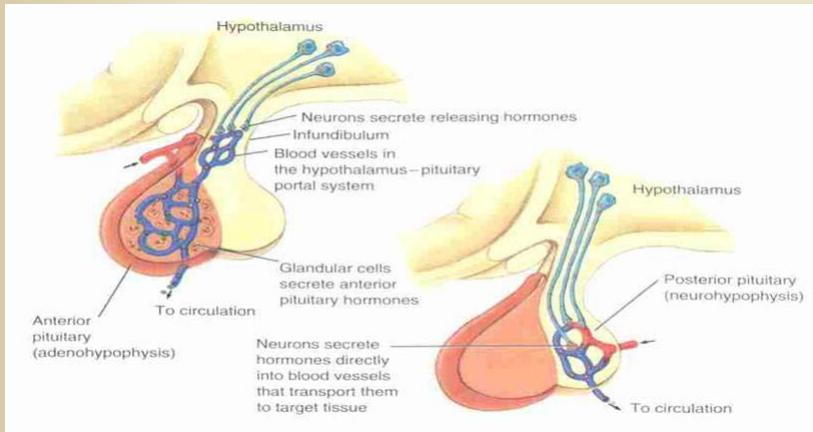
Mechanism of Action



Hypothalamus



Hypothalamic Control Pituitary



Posterior Pituitary

	Target	Actions
Oxytocin	Uterus Mammary	↑ Contraction ↑ Milk let-down
ADH	Kidneys	↑ Water reabsorption

Anterior Pituitary

	Target	Action
GH	Most tissue	↑ Growth
TSH	Thyroid	↑ TH secretion
ACTH	Adrenal Cortex	↑ Cortisol secretion

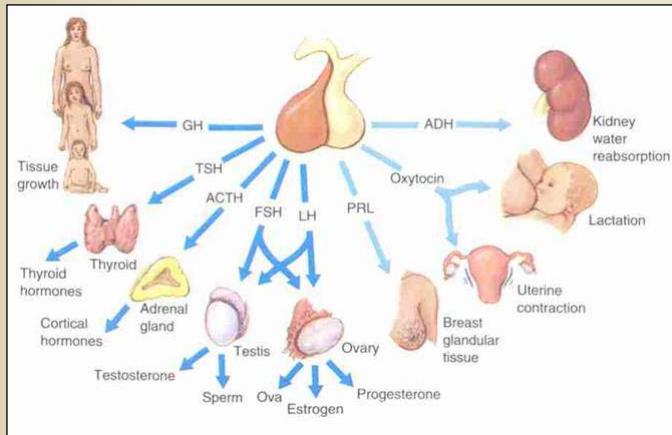
Anterior Pituitary

	Target	Action
FSH	Ovaries	Follicles
	Testes	Estrogen
LH	Ovaries	Sperm
	Testes	Ovulation
		Progesterone
		Testosterone

Anterior Pituitary

	Target	Action
Prolactin	Mammary Gland	Milk production

Pituitary Hormones



Thyroid



Thyroid

	Target	Action
Thyroxine	Most cells	↑ BMR
Triiodothyronine		
Calcitonin	Mostly bone	↓ Calcium

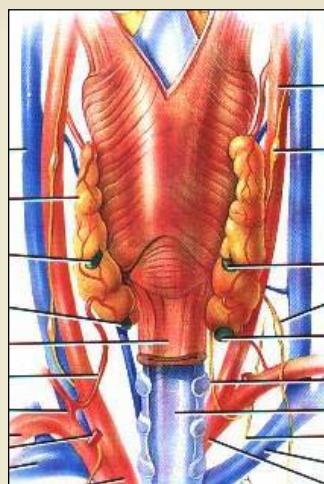
Hypothyroidism



Hyperthyroidism



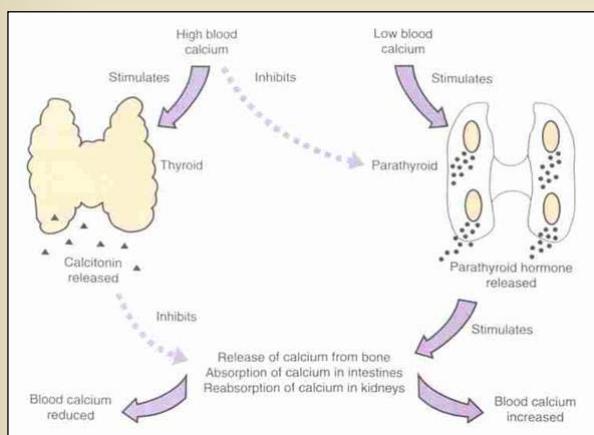
Parathyroid



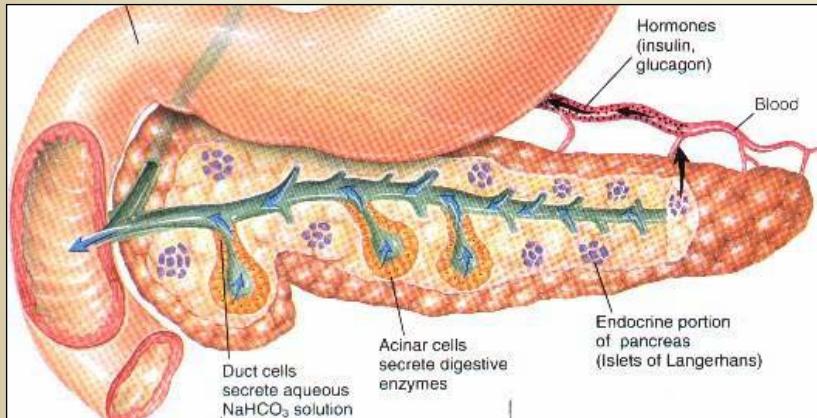
Parathyroid

	Target	Action
Parathyroid (PTH)	Bone Kidney GI Tract	↑ Calcium

Calcium Regulation



Pancreas



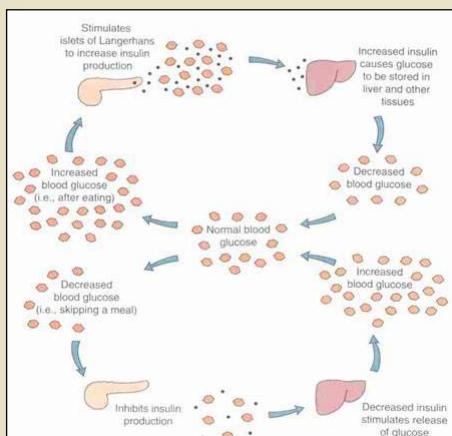
Pancreas

- Alpha cells: glucagon
- Beta cells: insulin

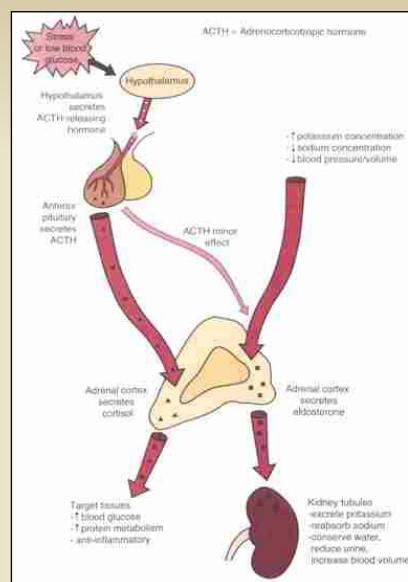
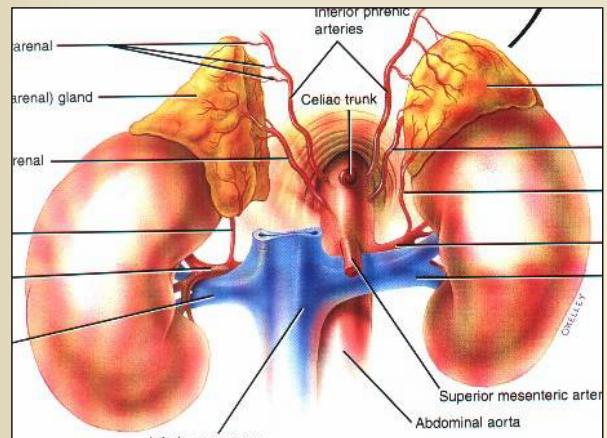
Pancreas

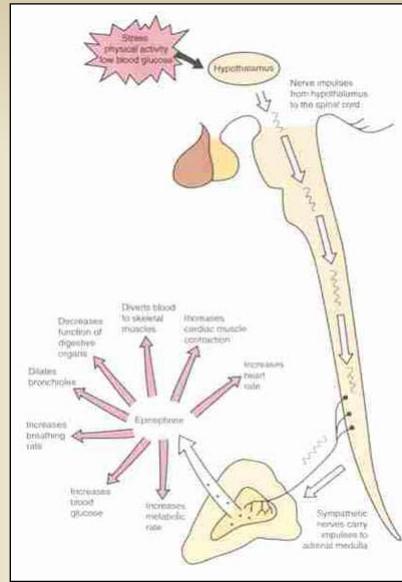
	Target	Action
Glucagon	Liver	↑ Glucose
Insulin	General	↓ Glucose

Glucose Regulation



Adrenal





Adrenal Medulla

Target	Action
Norepi Epi	Heart Blood vessels Liver

Adrenal Cortex

	Target	Action
Aldosterone	Kidney	↑ Na reabsorption ↑ Water retention
Cortisol	Most Tissue	↑ Glucose ↓ inflammation

Anterior Pituitary Drugs

Inadequate Growth Hormone

- Dwarfism
- somatrem (Protropin®)
- homatropin (Humatropin®)

Excessive Growth Hormone

- Acromegaly
- Gigantism
- Surgical removal 1°
- octreotide (Sandostatin®)

Posterior Pituitary Drugs

- Oxytocin
- ADH
 - Diabetes insipidus
 - Nocturnal enuresis
- vasopressin (Pitressin®)
- desmopressin (Stimate®)
- lyppressin (Diapid®)

Parathyroid Diseases

- Hypoparathyroidism
 - Inadequate calcium levels
 - TX: increased dietary calcium
- Hyperparathyroidism
 - Excessive calcium levels
 - TX: surgical removal

Thyroid Disease

- Hypothyroidism
 - Hormone replacement
 - levothyroxine (Synthroid®)
- Hyperthyroidism
 - Thyrotoxicosis
 - Surgical removal
 - propylthiouracil (PTU)

Adrenal Cortex

ACTH Hypersecretion

Cushing's Disease

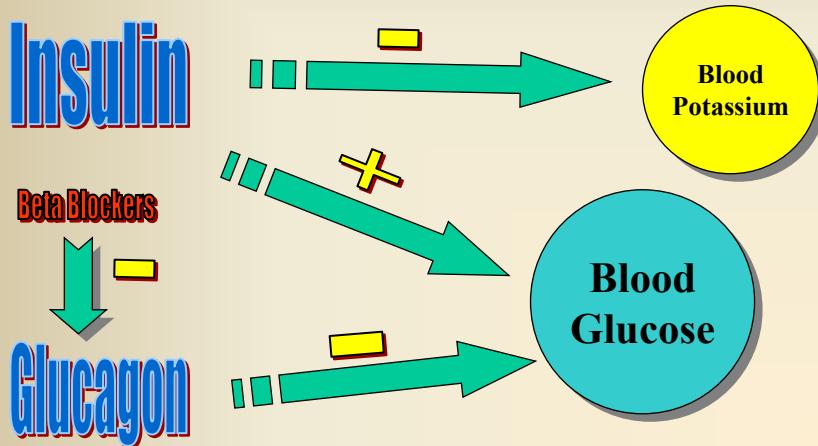
- Surgical removal
- Inhibit adrenal secretion
 - ketoconazol (Nizoral®)
- Symptomatic tx:
 - Antihypertensives

ACTH Hyposecretion

Addison's Disease

- Replacement therapy
- Cortisone (Cortistan®)
- Hydrocortisone (SoluCortef®)
- Fludrocortisone (Florinef Acetate®)

Pancreas



Insulin Preparations

- Regular Insulin
 - Natural insulin
- Modified Insulin
 - Increased duration of action
 - NPH (neutral protamin Hagedorn)
 - Natural plus protamin
 - Lente
 - Attached to zinc to prolong absorption

Oral Hypoglycemic Agents

Sulfonylureas

- ↑ insulin secretion
- tolbutamide (Orinase®)
- chlorpropamide (Diabinese®)
- glipizide (Glucotrol®)
- glyburide (Micronase®)

Alpha-glucosidase inhibitors

- Delay carbohydrate metabolism
- acarbose (Precose®)
- miglitol (Glyset®)

Biguanides

- metformin (Glucophage®)
- ↓ Glucose synthesis
- ↑ Glucose uptake

Thiazolidinediones

- ↑ Insulin effectiveness
- troglitazone (Rezulin®)

Hyperglycemic Agents

- Glucagon
 - ↑ gluconeogenesis
- D₅₀W

- diazoxide (Proglycem®)
 - Inhibits insulin release

Estrogens & Progestins

- Estrogens used for post-menopausal hormone replacement therapy.
 - estradiol (Estrace®)
 - conjugated estrogens (Premarin®)
 - estropipate (Ogen®)
- Progestin
 - Diminish side effects of estrogen therapy
 - Nausea, fluid retention, breast tenderness
 - medroxyprogesterone acetate (Provera®)
 - norethindrone acetate (Aygestin®)

Oral Contraceptives

- Combination of estrogen and progestin
 - Loestrin®, Levora®, Nordette®, Ovocon®, Norinyl® plus many others
- Minipill: progestin only
 - Micronor®, Nor-Q.D.®, Orvette®
- Prime side effect: ↑ risk of thromboembolism

Uterine Stimulants & Relaxants

- Stimulants (*Oxytocics*)
- ↑ uterine contraction
- Indication:
 - Induce labor
 - Postpartum hemorrhage
- oxytocin (Pitocin®)
- ergonovine (Ergotrate®)
- Relaxants (*tocolytics*)
- Relax uterine smooth muscle
- Beta₂ agonists
 - terbutaline (Brethine®)
 - ritodrine (Yuptopar®)

Infertility Agents

- Promote maturation of ovarian follicles
- clomiphene (Clomid®)
- urofollitropin (Metrodin®)

Male Reproductive Agents

- Testosterone Replacement
 - methyltestosterone (Metandren®)
 - fluoxymesterone (Halotestin®)
- Benign Prostatic Hypertrophy
 - Surgery
 - finasteride (Proscar®)

Sexual Behavior

- Most are side effects from other medications
 - Antihypertensives & psychoactive drugs
- sildenafil (Viagra®)